

Claims:

1. A method for allocating memory in a speech recognition system comprising the steps of:

Sub A1
acquiring a first set of data structures that contain a grammar, a word subgrammar, a phone subgrammar and a state subgrammar, each of the subgrammars related to the grammar;

acquiring a speech signal;

performing a probabilistic search using the speech signal as an input, and using the grammar and the subgrammars as possible inputs; and

allocating memory for one of the subgrammars when a transition to that subgrammar is made during the probabilistic search.

2. The method of claim 1 wherein the probabilistic search is a Viterbi beam search.
3. The method of claim 1 wherein the set of data structures is sent through a communication channel by a remote computer.
4. The method of claim 3 wherein the set of data structures is included in code that defines a web page.
5. The method of claim 3 wherein the set of data structures is associated with one or more web pages.
6. The method of claim 1 wherein the set of data structures is selected by a remote computer.
7. The method of claim 1 wherein the set of data structures is generated by the speech recognition system using information provided at least in part by a remote computer.
8. The method of claim 1 further comprising the step of acquiring a second set of data structures that contain a second grammar, a second word subgrammar, a second phone subgrammar, and a second state subgrammar, each of the second subgrammars related to the second grammar.
9. The method of claim 8 wherein the second set of data structures replaces the first set of data structures.

10. The method of claim 8 wherein the second set of data structures is acquired while the speech recognition system is operating.

11. In a speech recognition system, a method for recognizing speech comprising the steps of:

sub a² } acquiring a first set of data structures that contain a grammar, a word subgrammar, a phone subgrammar and a state subgrammar, each of the subgrammars related to the grammar;

acquiring a speech signal;

performing a probabilistic search using the speech signal as an input, and using the grammar and the subgrammars as possible inputs;

allocating memory for one of the subgrammars when a transition to that subgrammar is made during the probabilistic search; and

computing a probability of a match between the speech signal and an element of the subgrammar for which memory has been allocated.

12. The method of claim 11 wherein the probabilistic search is a Viterbi beam search.

13. The method of claim 11 further comprising the step of acquiring a second set of data structures that contain a second grammar, a second word subgrammar, a second phone subgrammar, and a second state subgrammar, each of the second subgrammars related to the second grammar.

14. The method of claim 13 wherein the second set of data structures replaces the first set of data structures.

15. The method of claim 13 wherein the second set of data structures is acquired while the speech recognition system is operating.

16. The method of claim 15 wherein the second set of data structures is included in code that defines a web page.

17. The method of claim 15 wherein the second set of data structures is associated with one or more web pages.

~~18. In a speech recognition system, a method for recognizing speech comprising the steps of:~~

~~acquiring a first set of data structures that contain a top level grammar and a plurality subgrammars, each of the subgrammars hierarchically related to the grammar and to each other;~~

~~acquiring a speech signal;~~

~~performing a probabilistic search using the speech signal as an input, and using the top level grammar and the subgrammars as possible inputs;~~

~~allocating memory for specific subgrammars when transitions to those specific subgrammars are made during the probabilistic search; and~~

~~computing probabilities of matches between the speech signal and elements of the subgrammars for which memory has been allocated.~~

19. The method of claim 18 wherein the top level grammar includes one or more word subgrammars, the word subgrammars including words that are related according to word-to-word transition probabilities.

20. The method of claim 19 wherein each word in a word subgrammar includes one or more phone subgrammars, the phone subgrammars including phones that are related according to phone-to-phone transition probabilities.

21. The method of claim 20 wherein each phone in a phone subgrammar includes one or more state subgrammars, the state subgrammars including states that are related according to state-to-state transition probabilities.

22. The method of claim 21 wherein the probabilities of matches between the speech signal and elements of the subgrammars for which memory has been allocated are computed using one or more probability distributions associated with each state.

23. The method of claim 21 wherein when a word is allocated in memory, an initial phone for the word and an initial state for the initial phone are also allocated in memory.
24. The method of claim 23 wherein one or more subsequent states are allocated in memory until the end of the phone is reached, the allocation based on a transition probability at each state.
25. The method of claim 24 wherein one or more subsequent phones are allocated in memory until the end of the word is reached, the allocation based on a transition probability at each phone.
26. The method of claim 21 wherein when a state probability falls below a state threshold, the state is deallocated from memory.
27. The method of claim 26 wherein the state threshold is dynamically adjusted.
28. The method of claim 21 wherein when a phone probability falls below a phone threshold, the phone is deallocated from memory.
29. The method of claim 28 wherein the phone threshold is dynamically adjusted.
30. The method of claim 21 wherein when a word probability falls below a word threshold, the word is deallocated from memory.
31. The method of claim 30 wherein the word threshold is dynamically adjusted.
32. The method of claim 26 wherein when all the states associated with a phone are deallocated from memory, the phone is deallocated from memory.
33. The method of claim 32 wherein when all the phones associated with a word are deallocated from memory, the word is deallocated from memory.

34. A method for allocating memory in a speech recognition system comprising the steps of:

- sub a⁴
- acquiring a set of data structures that contain a grammar and one or more subgrammars related to the grammar;
 - acquiring a speech signal;
 - performing a probabilistic search using the speech signal as an input, and using the grammar and the subgrammars as possible inputs; and
 - allocating memory for a selected one or more of the subgrammars when a transition to the selected subgrammar is made during the probabilistic search.

35. In a speech recognition system, a method for recognizing speech comprising the steps of:

- (a) acquiring a set of data structures that contain a grammar and one or more subgrammars related to the grammar;
- (b) receiving spoken input;
- (c) using one or more of the data structures to recognize the spoken input;
- (d) while the speech recognition system is operating, acquiring a second set of data structures that contain a second grammar and one or more subgrammars related to the second grammar; and
- (e) repeating steps (b) and (c), using the second set of data structures in step (c).

36. In a speech recognition system, a method for recognizing speech comprising the steps of:

- (a) acquiring from a first remote computer a set of data structures that contain a grammar and one or more subgrammars related to the grammar;
- (b) receiving spoken input;
- (c) using one or more of the data structures to recognize the spoken input;
- (d) while the speech recognition system is operating, acquiring a second set of data structures from the first remote computer or from a second remote computer, the second set of data structures containing a second grammar and

one or more subgrammars related to the second grammar; and
(e) repeating steps (b) and (c), using the second set of data structures
in step (c).